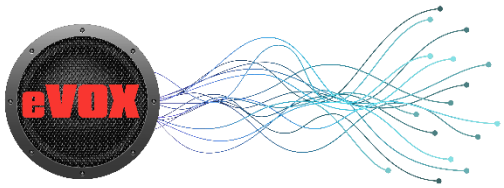

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Messaging System Using Cloud, Smartphone and Broadcast Radio Integration

A Unified Platform for Voice Alerts integrating Cloud, Radio & Mobiles

ABSTRACT

The eVOX Voice Messaging System enables rapid broadcast of high-quality voice alerts to communities via multiple delivery channels: Android and Apple smartphones, AM/FM broadcast radio receivers, and affordable VHF/UHF two-way radio transceivers. It serves as a high-speed, scalable community alert platform, delivering both natural and AI-generated voice messages with clarity and reliability to millions of people every minute.

Subscribers can choose specific cities or municipalities from which they wish to receive messages and update their preferences at any time to include provinces, states, territories, or regions of interest. When a message is broadcast, operators can override local preferences and transmit alerts nationally, ensuring urgent messages reach everyone, regardless of their settings.

For privacy assurance, eVOX does not track user locations, collect personal details, use GPS, or store any information that could identify the recipient.

eVOX is offered free of charge to subscribers. A modest fee is charged to public and private sector organizations to support the cost of infrastructure, software, and transmissions.

This white paper outlines the motivation behind the platform, the problems it solves, and the unique technical architecture that makes eVOX a powerful, modern tool for emergency and public service communication.

BACKGROUND

Traditional alert systems often rely solely on data networks, making them vulnerable to outages during emergencies. eVOX addresses this vulnerability by utilizing three independent communication paths: internet, AM/FM broadcast radio, and VHF/UHF two-way radio.

Built from the ground up for voice delivery, eVOX provides a far more effective alerting mechanism—voice has been shown to be 6 to 7 times more effective than text for urgent communication. Unlike text-based alerts and social media posts, eVOX ensures that tone, urgency, and intent are conveyed clearly, reducing misinformation and countering the spread of fake news.

eVOX AUSTRALIA Pty Ltd developed the eVOX system to provide a scalable, dependable, and multi-modal alternative—ensuring important voice messages reach people through resilient channels they already own and understand.

CHALLENGES WITH EXISTING ALERT SYSTEMS

Most conventional alert systems share the following limitations:

1. **Dependence on Internet or Mobile Networks:** Outages render systems ineffective.
2. **Text-Based Messaging:** Limits emotional tone and urgency; less effective during stress.
3. **Single-Channel Dependency:** Offers no redundancy during channel failure.
4. **Privacy Concerns:** Many apps require location access or personal data.

THE eVOX SYSTEM DESCRIPTION

eVOX is designed from the ground up to deliver clear voice alerts using three independent communication paths:

1. **Cloud-based mobile delivery** via Android and iOS apps
2. **Traditional AM/FM broadcast radio** for mass reach
3. **VHF/UHF two-way radio transmission** for reliability and offline access

These delivery channels work in unison or independently, ensuring redundancy and robustness under all conditions. Each component of the eVOX system has been developed, engineered, and deployed by eVOX AUSTRALIA Pty Ltd:

• **eRADIO ALERT STUDIO:** The central broadcast hub for creating, storing, and transmitting voice messages to radios, smartphones, and other receivers. All messages are encrypted at rest using multiple cryptographic methods and secured in transit via Transport Layer Security (TLS).

• **eVOX VOICE MESSAGING PLATFORM:** Developed in partnership with leading cloud infrastructure providers, this platform uses a Nonstop Transaction Model (NSTM) for continuous operation. It ensures high durability and availability by redundantly storing data across multiple geographically distinct zones, each with independent power, networking, and cooling systems. This architecture mitigates the risk of data loss due to localized outages, ensuring message delivery remains reliable even if an entire zone fails.

• **eRADIO ALERT SMARTPHONE MOBILE APPS:** Available free for Android (Google Play) and iOS (Apple App Store), the eVOX app appears like a regular mobile app but functions differently: it doesn't need to be opened or running to receive alerts. Voice messages are delivered instantly—even if the device is idle or the app is closed.

Urgency levels are clearly distinguished:

- High Priority: 30-second loud alarm, even if the phone is on silent.
- Routine Priority: 30-second softer tone.
- Low Priority: A brief, clear notification tone.

Users can subscribe to alerts from specific Cities or Municipalities and modify preferences at any time to receive alerts from any Province, LGU, or Barangay.

• **eRADIO ALERT RELAY:** This secure, remote-controlled switching system designed for radio broadcast applications, is proudly developed and manufactured by eVOX AUSTRALIA Pty Ltd.

The rack mounted interface device is placed in the audio chain between the program source (e.g., mixer output) and the audio processing stage (e.g., multiband compression, peak limiting, etc.). It requires a regulated 9V DC power supply and draws a maximum current of 1 Amp (9 watts of maximum power consumption). It connects to via an Ethernet RJ45 Cat5 or Cat6 cable.

• **eRADIO ALERT GATEWAY:** This secure, remote-controlled switching system designed for two-way radio transceiver interfacing is proudly developed and manufactured by eVOX.

The rack mounted interface device is connected to the microphone input of an existing VHF/UHF base transceiver. It requires a regulated 9V DC power supply and draws a maximum current of 1 Amp (9 watts of maximum power consumption). It connects to the STUDIO software via an Ethernet RJ45 Cat5 or Cat6 cable (10BaseT/100BaseTX).

TECHNICAL ARCHITECTURE AND PROTOCOLS

The eVOX voice messaging platform integrates three industry-recognised cloud services to ensure high performance and reliability: Amazon Web Services Simple Storage Service (AWS S3) for audio file hosting, Google Firebase Cloud Messaging (FCM) for secure push notification delivery, and Google Cloud APIs for natural-sounding text-to-speech and language translation.

The eRADIO ALERT RELAY and eRADIO ALERT GATEWAY radio interface devices both operate on ESP32-S3 hardware and communicate using AWS IoT Core MQTT telemetry over secure port 8883, secured with X.509 device certificates for authentication and authorisation. Where an internet connection is unavailable, devices can alternatively operate via FTP audio file transfer over a private LAN using static IP addressing.

The eVOX platform uses a proprietary cipher system based on the Advanced Encryption Standard (AES), incorporating a randomized salt and initialization vector (IV) to strengthen cryptographic security. An additional Cipher configuration object—specifying algorithm, mode and padding—is applied during both primary and secondary registration processes, including anonymous telemetry for proactive load-balancing purposes.

MESSAGE FLOW

Messages are assigned one of three priority levels and routed using a proprietary coded filtering algorithm that enables the system's flexible and targeted messaging capabilities. This ensures, for example, that critical alerts intended for an entire province are still received by users who have opted in only for Barangay-level updates.

All messages are transmitted with a Time To Live (TTL) of 6 hours. TTL defines how long a message should remain in Firebase Cloud Messaging (FCM) storage if the recipient device is offline. If the device remains unreachable beyond the TTL period, the message is discarded and will not be delivered. This mechanism is essential to ensure that only timely and relevant messages are received by end users, preventing outdated alerts from causing confusion or delivering misleading information.

COMPRESSION STANDARDS

eVOX software uses MP3 bitrate compression standards for all audio messages and internally converts and compresses RAW PCM audio to MP3 after applying dynamic range compression.

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